

Aims report examples

[Education](#), [Sustainability](#)



SUSTAINABILITY OF SINGAPORE'S S. E. A. AQUARIUM

PART I

Introduction

There is a growing awareness about the pace of global warming as well as the socio-political, economic, political and other effects it has had, and is likely to have on the human population and the natural environment. The planet's temperatures have risen by 1.4°F over the last century, and are expected to rise by a further 2 to 11.5°F the course of this century. With the increases in the planet's surface temperatures have resulted in increases in the energy stored in the climate system, and with it, there is an increased incidence of extreme weather (drought, flooding intense rainfall and severe heat waves). Further, oceans are warming, acidifying and rising. These changes have massive consequences on the natural environment and with it, the socio-political and economic activities that are dependent on them.

Tourism is one such economic/sociocultural activity, which has, and is bound to be affected further by the changing climate.

According to World Tourism Organization Network (2014), climate change is a phenomenon that has already affected the sector, with certain destinations (e. g. coastal destinations and mountain regions) seeing marked changes in the number of visitors. The industry has equally played a contributory role in contributing to the greenhouse gasses emission and destruction of the natural environment, which is why it is urgent to emphasize sustainability.

Sustainability principles comprise striking a proper balance among the economic, social-cultural and environmental aspects of tourism developments. To this extent, sustainable tourism must meet the present

population's needs, while also protecting and bolstering opportunities for the future.

Sustainable tourism development necessitates informed participation of all stakeholders, coupled by strong political leadership to secure wide participation and consensus. Sustainable tourism is a continuous process that necessitates continued impact monitoring to protect gains in sustainability and create new benefits. On the other hand, sustainable development involves meeting the needs of the present population/generation while at once protecting and enhancing opportunities for the future. Management of resources should meet the needs of the current generation, within the bounds of the ability of the resources to meet the needs of future generations. Effectively, sustainable tourism and development as concepts are threatened by the adverse human influence on the climate system, which has resulted in anthropogenic increases in greenhouse gas concentrations as well as other anthropogenic forcings together. In order to ensure sustainable tourism, WWF Mediterranean Programme (2012), recommends proper zoning with strict protections for biologically-sensitive coastal areas; creation of clear tourism product and niche; investment planning that takes into consideration the natural environment; proper monitoring/evaluation; and development of innovative property regimes to facilitate the implementation of desirable social/environmental conditions for investment. Further, in order to ensure sustainable tourism, investment appraisal must include twelve distinct measures. These include local prosperity, social equity, employment quality, visitor fulfilment, community wellbeing, economic viability, environmental

purity, resource efficiency, local control, cultural richness, biological diversity, and physical integrity.

Scholarly attention in this area has tended to develop along several distinct lines of inquiry. These include research founded on statistical behaviour models. The first line of inquiry has been the creation of statistical models to assess the sensitivity of tourists' decision-making as a function of the climate/weather. Hamilton & Tol (2008) points to uses of cost models to determine that there existed a definite relationship between tourism demand and specific weather variables. Other studies have identified the existence of a relationship between the demand of certain tourist destinations and weather while even more researchers have endeavoured to build weather-specific tourism indicators. The results across all these lines of inquiry not only indicate that climate change has had, and will have a massive impact on the sustainability of tourism, but also, the weather-induced effects have an adverse effect on the bottom line.

- Optimally utilize environmental resources that comprise a major aspect in tourism development, as well as the maintenance of the ecological processes that help conserve natural biodiversity and heritage
- Protect the socio-cultural authenticity of the respective host communities, coupled by the conservation of the built/living cultural heritages and traditional values, while at once contributing to intercultural tolerance and understanding.
- Ensure long-term and viable economic operations, providing socio-economic benefits to stakeholders that are distributed fairly (Cernat & Gourdon, 2007; WWF Mediterranean Programme, 2012)

Objectives & Indicators

In order to achieve the aims, specific objectives and measures have been chosen based on the simplicity, feasibility, effectiveness and identification of emergent risks to sustainability.

Economic Objectives/Indicators

- Determining the effect of climate change on the seasonal nature of demand for the SEA Aquarium, to justify the economic and ecological effects of the infrastructural investments
- Determining if there is an adequate supply of tourist assets (natural resources and cultural attractions) in Singapore to maintain an economically viable tourist demand given the changing climatic conditions
- Determining the multiplier effect of SEA Aquarium-related tourist contributions to the economy of the Sentosa Island given the changing climate

Socio-cultural Objectives/Indicators

- Assessing the implementation of quality and environmental standards recommended by relevant international agencies
- Determining the number and climatic-sensitivity of employment opportunities created by the SEA Aquarium and the primary support industries in Sentosa Island/Singapore
- Determining the possible changes in the net income contribution by the SEA Aquarium and its primary support industries relative to the rest of the Sentosa economy as climate changes

Environmental Sustainability

- Supply of renewable and non-renewable natural resources (e. g. water and animal/fish species) required by the SEA Aquarium
- Sentosa's land, biodiversity and ecosystem sustainability
- Waste (waste water and solid water) collection and disposal

PART II: Method

The Sentosa-based SEA Aquarium facility is the world's largest aquarium, harbouring upwards of 100, 000 marine animals drawn from more than 800 species. The aquarium comprises 45 million litres of water. The facility forms a part of the Marine Life Park in Sentosa, Singapore. The Aquarium large observation decks where visitors can view the animals through massive aquarium glass walls and underwater restaurants etc.. The Aquarium was opened in November 2012. Sentosa Island is a Singaporean tourist resort that receives in excess of 20 million visitors annually, and other than the water park; other tourist attractions include theme parks and sheltered beaches.

The sustainability assessment was conducted using two separate data collection methods i. e. participant observation and semi-structured questionnaires (or interviews based on the questionnaires).

Participant Observation

The researcher travelled to Sentosa Resort Island, where he lived for a month as a tourist. The researcher interacted freely with the locals, tourists, and employees. Extensive field notes of data gathered through systematic observations were kept by the researchers, on a range of issues of interest

with regard to the identified sustainability indicators. This approach was particularly helpful in understanding the unquantifiable effects of the SEA Aquarium on the population and culture. Quantitative data (including estimations of the number of tourists, employees and sizes) were also collected.

Survey

In order to supplement data collected through participant observation, the researcher drew a sample of 30 respondents using stratified random sampling. The sample comprised of 10 SEA Aquarium employees/managers, 10 visitors and 10 locals (Sentosa/Singaporeans). The participants were randomly approached and requested to participate in the assessment, after which the respective samples were drawn from the lists of willing participants depending on whether they were employees, tourists or locals. The researcher either sent questionnaires to the respondents or conducted telephone interviews using the questionnaires as schedules. To ensure reliability/validity, questionnaires designs were piloted on five participants prior to the actual study, while all data collected was triangulated with matching data from records that were available to the researcher from the company and the local authorities. Once completed, the data was transcribed, coded and analysed.

PART III: Results

PART IV: Discussion Climate change will have considerable effects on multiple factors that affect the sustainability of Sentosa SEA Aquarium. The evidence from the above assessment points to a firm economic foundation for the

Aquarium, which may last into the long term. According to Jovicic & Ilic (2008), the ideal situation occurs when 30 percent of the annual visitor traffic is attained during the high season. Sentosa's tropical climate and the insensitivity of its attractions to the weather ensures that the Island has a constant flow of visitors and revenues, besides ensuring the full utilization of the revenues. In addition, tourists are not only attracted to the SEA Aquarium but to the tens of other tourist assets on the Island. The Aquarium is only a party of a multi-billion mega investment that includes Universal Studios, a Maritime Experiential Museum, a casino and multiple five-star hotels/restaurants. The diversity of potential attractions to the Island will ensure a sustainable demand, even if one attraction fails (Resort World Sentosa, 2014; Cernat & Gourdon, 2007).

Further, the Sentosa Island's linkages with other economic sectors in Singapore create multiplier effects on the economy, generating demand for primary, secondary and tertiary industries. The effect begins with the \$5.7 billion sunk into the Island (and the rest of Singapore) and absorbed by the construction industry, regulatory authorities, planners/developers, local authorities, engineers and contractors, tourism operators and real estate companies among others. Similar linkages will persist in the economy in the long-term. However, the additional expenditure on the Island has an upward pressure on prices to the detriment of the locals' purchasing power.

Increased visitor population would also result in increased greenhouse gasses emissions not only because of the higher demand on resources but also because of the need for transportation, etc.

While the economic prospects are promising, there are possible difficulties

with socio-cultural and environmental sustainability. SEA Aquarium already has a Maritime Experiential Museum and an elaborate education program to help the visitors gain knowledge about marine wildlife and the natural environment, more still needs to be done to ensure long term sustainability. Similarly, Sentosa Islands has numerous sociocultural events that celebrate the local culture, which will ensure that it remains alive into the long-term. The population should also benefit in the long term because of the provision of infrastructure and public goods, which render the quality of life better. Climate change may force significant changes in people's lifestyles and culture, which would result in the losses of such aspects, which is why it is important that they be preserved. However, SEA Aquarium as well as the Sentosa Island must invest more in the Singaporean cultural heritage, crafts, architecture, cultural and sporting events as well as museums. The Island's economy is dominated by tourism and the SEA Aquarium forms about a significant part of the island's income. Further, the share of local employees among the SEA Aquarium's workforce remains low at 69%.

Perhaps the largest threat to sustainability stems from the pressure on renewable and non-renewable natural resources as the climate changes and as the demand increases due to increased tourist population grows. The SEA Aquarium and other associated industries require considerable energy, water, marine animals and other resources. It is unsustainable to keep harvesting upwards of 100, 000 marine animals for the Aquarium. Similarly, According to the Natural Resources Defense Council (2010) and Intergovernmental Panel on Climate Change (2011), global warming would causes oceans to rise, eating into the coastal land areas, Higher sea levels

would also contaminate coastal water resources and sanitation installations, besides reducing precipitation, which will in turn affect surface and ground water supplies. Low rainfall also slows down the recharge levels of underground water resources, to the detriment of the sustainability of such resources. Effectively, the SEA Aquarium's demand for massive amounts of fresh water to support the tourist population is unsustainable in the long term. This is worsened by Singapore's excessive dependence on natural gas and coal in electricity generation, which not only worsens the Island's carbon footprint, but also because both these energy sources are unsustainable. Other sustainability challenges include disruptions in the region's biodiversity because of high surface temperatures, nutrient concentration and acidity affects microbial activities. This would in turn have far-reaching effects on the region's wildlife. Ocean acidification, for instance, affects the growth of coral reefs, which in turn disrupts the natural lifecycle of thousands of marine animal species. This could threaten some species and thus the very business model than SEA Aquarium is founded on, since depletion of some marine animals could lead to bans/moratoriums barring their capture and trading. The last indicator of SEA Aquarium's sustainability regards its ability to deal with the potentially large number of wastewater, solid wastes and other wastes, given the relatively small size of the Island and the large number of visitors over the long term. The possibility of increased dumping into the ocean and general pollution is hurtful to the natural environment.

PART V: Recommendations

- In order to avert a possible crisis shortages in the supply of natural resources such as water, increased recycling of resources should be

encouraged. Desalination plants to obtain clean water resources from the ocean would also ease the pressure on the available resources greatly.

- Reliance on non-renewable and pollution-laden energy sources is unsustainable. Instead, investment in green energy sources including solar energy (given the tropical weather) and harnessing of tidal energy would be more sustainable

- Harvesting of marine animals from the ocean is unsustainable with the changing climate, which is why SEA Aquarium must start its own nurseries to breed marine animals for the aquarium.

- Construction/creation of more attractions that draw on (preserve) the local culture including museums, architectural designs and crafts, cultural and sporting events.

- Increased shared of local participation both in employment and tourist populations to wean the facility off its excessive dependency on foreigners, which renders SEA Aquarium vulnerable to competition in other countries.

- Similarly, to promote socio-cultural sustainability, education should be built into all aspects of the business, to create awareness about the natural environment and local cultures. Hiring trained educators, experiential learning programs, allocation of resources to support research efforts and engagement in collaborative efforts with similar institutions is critical to the future of the facility.

Conclusion

This research effort developed socio-culture, economic and natural environmental measures of sustainability, against which Sentosa-based SEA Aquarium was evaluated (Jovicic & Ilic, 2008; Australian Department of

Environment, 2013; Cernat & Gourdon, 2007). The evaluation reveals a strong economic future for the development as well as other developments on the Island but also shows that several unsustainable socio-cultural and environmental aspects could threaten this potential. The report's findings should be used to bolster SEA Aquarium's sustainability potential, but perhaps most crucially, the weak areas need to be fixed urgently to protect the gains that have already been made. However, in applying the findings and recommendations of this report, it is important to bear into consideration the significant limitations of the researchers' design. Participant observation yields highly subjective data, while the small sample size for the survey is also subject to validity/reliability threats. It is necessary to carry out similar studies to validate this report's findings.

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